Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences 29 (2015) 219 – 220

Procedia Environmental Sciences

Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)

Enhanced ultraviolet-B radiation affect growth, yield and physiological processes on triticale plants

E. Bacelar[a]*, J. Moutinho-Pereira[a], H. Ferreira[a], C. Correia[a]

[a]*CITAB, Universidade de Trás-os-Montes e Alto Douro, Apt. 1013, 5001-801 Vila Real, Portugal*
** Corresponding author: areale@utad.pt*

Abstract

Climate change will affect the expected recovery of stratospheric ozone layer to pre-1980 levels and ozone depletion is still an important concern in scientific community, due to the resulting increase in UV-B (280-315 nm) radiation at the Earth's surface (WMO, 2011), with negative impacts in plants and animals (Björn, 1996; Caldwell *et al*., 2007; Correia *et al*., 2012). The aim of this work, carried out in a glasshouse, was to evaluate the influence of enhanced UV-B radiation, simulating a 20% reduction in the ozone layer over northern Portugal, on triticale (x Triticosecale Wittm.) crop. Enhanced UV-B induced reductions in plant height, total green leaf area, leaf area per leaf, total biomass, grain yield, grain number, grain weight, transpiration rate and stomatal conductance. In opposition, UV-B treated plants had higher maximum and minimum chlorophyll fluorescence, chlorophylls, carotenoids, starch and UV-B absorbing compounds concentrations and intrinsic water use efficiency, indicating an active plant response to UV-B-induced stress. Meanwhile, no significant differences were detected in internodes number, total leaf number, leaf area ratio, specific leaf area, leaf weight ratio, maximum quantum yield of PSII, leaf thickness, stomatal density, soluble proteins and soluble sugars concentrations. In conclusion, the sensitivity of triticale plants to a supplemental dose of UV-B radiation, based on the negative effects on growth, yield and physiological processes, may have important economic consequences in this multi-purpose crop.

ACKNOWLEDGEMENTS: "This work was supported by national funds by FCT – Portuguese Foundation for Science and Technology, under the project PEst-OE/AGR/UI4033/2014."

Peer-review under responsibility of the organizing committee of the Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)

Keywords: Gas exchange; Leaf metabolites; Triticale; Ultraviolet-B radiation.

Peer-review under responsibility of the organizing committee of the Agriculture and Climate Change - Adapting Crops to Increased Uncertainty (AGRI 2015)
doi:10.1016/j.proenv.2015.07.281

References

1. Björn LO. Effects of ozone depletion and increased UV-B on terrestrial ecosystems. *Int J Environment Studies* 1996: **51**:217–243.
2. Caldwell MM, Bornman JF, Ballaré CL, Flint SD, Kulandaivelu G. Terrestrial ecosystems, increased solar ultraviolet radiation, and interactions with other climate change factors. *Photochem Photobiol Sci* 2007;**6(3)**:252-66.
3. Correia CM, Coutinho JF, Bacelar EA, Gonçalves BM, Björn LO, Moutinho Pereira J. Ultraviolet-B radiation and nitrogen affect nutrient concentrations and the amount of nutrients acquired by above-ground organs of maize. *ScientificWorldJournal* 2012;2012:608954. doi: 10.1100/2012/608954.
4. WMO (World Meteorological Organization), Scientific Assessment of Ozone Depletion: 2010, Global Ozone Research and Monitoring Project Report No. 52, 516 pp., Geneva, Switzerland, 2011.